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### PHOTOGRAPHING INTERFERENCE PHENOMENA

The interferometer is being applied more and more to measurements of physical changes. However, visual observation of its indications is very fatiguing, and the limit of endurance is soon reached. Hence, there is need for a practical automatic recorder of interference phenomena. The application of motion picture photography is not always satisfactory because it is limited to rather slow movements of the interference fringes; moreover, a large amount of film is required, and processing difficulties are comparatively great.

For satisfactory photographic recording of thermal-expansion data, it is highly important that the design of the apparatus provide a means of making such instrumental adjustments as may be necessary during the recording period without destroying the continuity or quality of the record. Other important requirements are sufficient illumination without overloading the light source, constant and enduring illumination, light of high purity, and simplicity of operation. A photographic recorder (designated an interferograph) that fulfills the above requirements has been designed by James B. Saunders of the

Bureau's Polarimetry Section, and has been found fully satisfactory for both general and specialized interferometer work.

As explained in detail in the September number of the Journal of Research (RP1668), the record is produced on a strip of 35-millimeter film that is close to, and moves uniformly past, a narrow slit located in the image plane of the fringe system. As the change in the order of interference is recorded only at points along the slit, a fiducial mark must also intersect the slit. This mark then traces a reference line throughout the length of the photograph, and its intersection with a photographed fringe corresponds to the time when this fringe passes the reference mark of the interferometer. With this instrument, 200 easily readable fringes may be photographed on 1 meter of film. However, the relationship between the width of the photographed fringes and the amount of film per fringe varies with the angle between fringes and slit. The amount of film used by the instrument in an ordinary test is so small that it can be processed in any dark room. No enlargement is needed to read the data from the negative unless the interferometer fringes are allowed to become too narrow.

<sup>1</sup> Published with approval of the Director of the Budget.

As the instrument requires only a narrow strip of the image, the light forming the remainder is reflected to one side where it is used to view the interferometer at any time during the recording period. This enables the operator to see the interference phenomena and to make any necessary instrumental adjustments. Three film speeds are available for recording very slow, medium, and rapid changes in the order of interference.

A constant-deviation prism insures pure monochromatic light, and as the light passes through the prism twice, the dispersion is sufficient to isolate any spectral line if it has no neighboring line within 50 angstroms. By using noncolor-sensitized films, this new instrument will be found satisfactory for recording thermal-expansion data up to very high temperatures.

#### FLIGHT SIMILITUDE TESTS OF RADIOSONDES

Accurate weather forecasting requires a knowledge of the weather conditions in the air up to some 50,000 to 55,000 feet. In past years it was the custom to make routine airplane flights to secure a partial knowledge of these conditions. These flights were costly and rarely reached 35,000 feet.

The development of the radiosonde, a fairly cheap and light instrument, which can be carried to heights of 60,000 to 80,000 feet by means of small balloons, has made it possible to learn of these conditions much more frequently, more accurately, and more cheaply.

The elements of the instruments, which measure air temperature, pressure, and humidity, control the signals from a radio transmitter. These signals are received and recorded on the ground in a form easily converted to readings of temperature, pressure, and humidity. Temperatures below  $-60^{\circ}\text{C}$ . ( $-70^{\circ}\text{F}$ .) may be recorded in the altitude range of 60,000 to 80,000 feet.

Acceptance tests are being made at the Bureau on random samples of radiosondes purchased by the Navy Department. A flight similitude test to obtain the performance of the sondes in measuring pressure and temperature is an important part of the work. In this test the radiosonde is subjected simultaneously to decreasing air pressure and temperature at controlled, specified rates that correspond to average conditions in an actual ascent. The signals are received on a recorder similar to that used in service and on an auxiliary

recorder. In addition, the actual pressures and temperatures in the chamber, measured by standard instruments, are recorded so that the errors of the radiosonde indications can be determined.

The pressure chamber is a cast iron cylinder with pressure taps and electrical connections, and is equipped with a fan operated by an external electric motor to ventilate the sonde during the test at a rate corresponding to the ventilation in actual flight. The pressure chamber is installed in a liquid bath to which pulverized dry ice is added as required to maintain the specified rate of decrease of temperature in the pressure chamber. The temperature of the radiosonde temperature element is measured by thermocouples, the pressure by a precise, calibrated aneroid barometer.

#### ENGINE PERFORMANCE OF SUB- STITUTE MOTOR FUELS

In the course of the investigation of substitute motor fuels, conducted by the Bureau for the Foreign Economic Administration and referred to in Technical News Bulletin 339 (July 1945), studies have been made of many phases of fuel performance in both test and stock engines. The substitute fuels used in the investigation included charcoal gas, shale oil, naphtha, and vegetable fermentation products such as ethyl alcohol, acetone, butanol, and other materials. The work on liquid fuels covered studies of the volatility of fuels and blends, rate of evaporation loss, effect on pump diaphragms, starting, warm up, vapor lock, manifold distribution, knock rating, power, economy, spark advance, oil consumption and dilution, engine deposits, cylinder wear, and exhaust composition.

As explained in an article that Donald B. Brooks has prepared for publication in "Automotive Industries," this investigation showed that use of substitute liquid fuels would not result in increased wear or corrosion of the engine or fuel-system components. The maximum power developed with these liquid fuels is within a few percent of that developed with gasoline, but the fuel mileages are poorer in proportion to the lower heats of combustion of the substitute fuels. Engines especially designed to utilize the higher antiknock properties of these fuels would reduce the difference in fuel mileages. Where liquid fuels are not available, gas generated from charcoal or other solids can be used in automotive equipment, but only at the sacrifice of nearly half of the power.

# VAPOR PRESSURES AND BOILING POINTS OF HYDROCARBONS

In the September number of the Journal of Research (RP1670) are published the results of an investigation on the vapor pressures and boiling points of a large number of purified hydrocarbons. This work forms part of the American Petroleum Institute's Research Projects 6 and 44 and was performed by C. B. Willingham, W. J. Taylor, J. M. Pignocco, and F. D. Rosini of the Bureau's Section on Thermochemistry and Hydrocarbons.

Measurements of vapor pressures and boiling points, over the range 47 to 780 millimeters of mercury and above about 12° C, were made on 52 purified hydrocarbons. The apparatus consisted of an electrically heated boiler, a vapor space with a vertical reentrant tube containing a platinum thermometer having a resistance of 25 ohms, and a condenser. Measurements of the temperature of the liquid-vapor equilibrium were made at 20 fixed pressures maintained automatically. The pressure values were determined by calibrating the apparatus with water, using vapor pressure-temperature tables prepared at the Bureau.

The experimental data on the hydrocarbons were correlated, by the use of the method of least squares, with the three-constant Antoine equation for vapor pressures,  $\log P = A - B/(C + t)$  or  $t = B/(A - \log P) - C$ . Experimental data, together with the values of the three constants of the Antoine equation, applicable over the range of measurement, are reported for the following compounds:

## PARAFFINS

<i>n</i> -Pentane.	2,2-Dimethylhexane.
2-Methylbutane (isopentane).	2,3-Dimethylhexane.
<i>n</i> -Hexane.	2,4-Dimethylhexane.
2-Methylpentane.	2,5-Dimethylhexane.
3-Methylpentane.	3,3-Dimethylhexane.
2,2-Dimethylbutane.	3,4-Dimethylhexane.
2,3-Dimethylbutane.	2-Methyl-3-ethylpentane.
<i>n</i> -Heptane.	3-Methyl-3-ethylpentane.
2,2-Dimethylpentane.	2,2,3-Trimethylpentane.

3,3-Dimethylpentane.	2,2,4-Trimethylpentane.
<i>n</i> -Octane.	2,3,3-Trimethylpentane.
2-Methylheptane.	2,3,4-Trimethylpentane.
3-Methylheptane.	<i>n</i> -Nonane.
4-Methylheptane.	<i>n</i> -Decane.
3-Ethylhexane.	<i>n</i> -Dodecane.

## ALKYLCYCLOPENTANES

Cyclopentane.	<i>n</i> -Propylcyclopentane.
Methylcyclopentane.	Isopropylcyclopentane.

## ALKYLCYCLOHEXANES

Cyclohexane.	<i>cis</i> -1,3-Dimethylcyclohexane.
Methylcyclohexane.	<i>trans</i> -1,3-Dimethylcyclohexane.
Ethylcyclohexane.	<i>cis</i> -1,4-Dimethylcyclohexane.
<i>cis</i> -1,2-Dimethylcyclohexane.	<i>trans</i> -1,4-Dimethylcyclohexane.
<i>trans</i> -1,2-Dimethylcyclohexane.	<i>n</i> -Propylcyclohexane.

## ALKYLBENZENES

Benzene.	<i>m</i> -Xylene.
Toluene.	<i>p</i> -Xylene.
Ethylbenzene.	<i>n</i> -Propylbenzene.
<i>o</i> -Xylene.	Isopropylbenzene.

## REVIVIFICATION OF BONE CHAR

A report is now being prepared on the recent study of three industrial units for the revivification of bone char. It has been necessary to supplement the plant data by some pertinent laboratory determinations. About 60 samples of bone chars were taken during this investigation, and these are being analyzed for their content of carbon and hydrogen and for the total loss-upon-ignition of the acid-washed residues. The pH of aqueous extracts of these chars is likewise being obtained. In order to supplement the gas-analyses data already collected, some additional information is being obtained on the composition of the gases expelled upon heating a given sample of service char under three conditions: (1) The original revivified char alone, (2) the original revivified char plus a small amount of sucrose, and (3) the original revivified char plus blackstrap molasses, followed by thorough water-washing.

The three types of furnaces available for this investigation differed widely in their modes of heat transfer. In the conventional kiln the products of com-

bustion of the fuel were in contact with the outside walls of the retorts. The heat flow, therefore, was through the metal walls into the inclosed cylinder of char. The gas space in contact with the char was simply that which exists between char particles. On the other hand, the gaseous products of combustion of the fuel in the Herreshoff furnace were in direct contact with the bone char. The heat flow in this case was from the higher temperatures of the gas to the slowly moving bed of char beneath. The gaseous products of the bone char were diluted greatly by the gaseous combustion products of the fuel and the large volume of recirculated gases. The modified Weinrich decarbonizer presented the third example. The rotating drum of the decarbonizer was externally heated. The char within the drum was lifted and cascaded to the bottom from where it was again lifted. Heat flowed through the metal walls of the drum into the bed of char, and because of the intimate contact with the air within the drum, the air assumed the temperature of the char. Therefore, only a small temperature gradient existed within a given cross section.

In the completed report, an attempt will be made to present a discussion of these three pieces of equipment to bring out their individual characteristics. It is expected that the data obtained in this work will lead to the design and building of an improved pilot plant for the treatment of bone char.

#### VAPOR SEALS FOR HOUSE WALLS

The Bureau's investigation of vapor barriers for walls of houses has been extended to include the possibilities of combining vapor resistance with decorative features in interior finish so as to provide barriers that would be continuously accessible for inspection, and to reduce fire hazards.

Samples of wall papers applied in the conventional manner allowed 1,400 grams of moisture per square meter per day to pass through the wall, whereas samples of the same paper applied with a vapor-resistant adhesive reduced the passage of moisture vapor a hundredfold. Samples of wallpapers having a vapor-resistant coating on their faces, and applied in the conventional manner also reduced the passage of moisture vapor a hundredfold. Unfortunately, no vapor-resistant adhesive or coating has been found that does not disfigure wall paper. Vapor-resistant plastic sheetings, though difficult to apply, were

found in other respects to be very satisfactory. Paint films and varnishes with and without metal powders were easy to apply but gave variable results. Good aluminum, copper, and other metal foils were in most cases impervious to moisture vapor. Hence, particular attention is being given to the possible use of foil on the interior surfaces as a base for decorative finishes.

#### RESIN-BONDED, WET-STRENGTH PAPERS

The use of synthetic resins in paper to hold the fibers together with an insoluble bond is discussed by C. G. Weber in a report that he has prepared for publication in *Printing Equipment Engineer*. At the Bureau, where studies of resin bonding in the manufacture of wet-strength papers for war maps is in progress, resins have been used to give paper better resistance to rough usage when wet than was heretofore possible. Papers are now being produced that can be successfully laundered with hot water and soap or cleaned in gasoline or other solvents after having been smeared with mud or oil and grease.

Although resin-bonding has been confined largely to wartime purposes, a start has been made in applying it to civilian papers. It has been employed with important benefits in wrappings, toweling, bags, posters, shipping tags, photographic papers, lens wiping tissues, facial tissues, garbage containers, diaper backing, handkerchiefs, and field notebooks. An indication that the same technic can be used to reduce the tendency of printing papers to alter their dimensions, curl, wave, and buckle with changes in the weather suggests the possibility of extending resin bonding into that field. Here, the improvement would be of more benefit to the printer than to the ultimate users of the papers.

#### PERMEATION OF CONCRETE BY GASOLINE VAPOR

Several concrete specimens were tested recently by R. L. Blaine, of the Bureau's Cement and Concrete Section, for rate of permeation of gasoline vapor. In the concretes, the proportions were  $5\frac{1}{2}$ , 6, and  $6\frac{1}{2}$  sacks of cement per cubic yard and 5, 6, and 7 gallons of water per sack of cement. Tests were made at 40°, 70°, and 100° F. for periods up to 4 weeks. The rate of loss of gasoline for the first week of tests at 70° F. ranged from 0.10 to 0.22 gallon per day per 100 square feet of top surface, and the rate decreased with time of exposure. The richness of mix and

amount of mixing water in the concrete affected the loss of gasoline slightly. Coating the tops or the bottoms of the concrete specimens with glue-glycerin or asphalt did not greatly reduce the loss of gasoline from the containers. Air-dried concrete exposed to gasoline vapor in a closed container increased 1 percent in weight in 7 days. The 7-day loss of gasoline from the containers with the concrete test specimens sealed in them was less than the quantity that could be accounted for by adsorption of the gasoline vapor by the concrete.

#### **DISTRIBUTION OF BOND STRESS IN CONCRETE PULL-OUT SPECI- MENS**

Engineers, in designing reinforced-concrete structures, must ascertain the safe bond stresses between steel and concrete. Although there is no standard test for the bonding efficiency of reinforcement bars, designers are guided in part by the bond strength of a bar embedded in a concrete prism as determined from numerous pull-out tests.

A study, which will be published in the *Journal of the American Concrete Institute*, was made by David Watstein of the Bureau's Masonry Construction Section to determine the distribution of bond stresses in pull-out specimens of two different lengths and with five different types of bars. This was a continuation of a previously completed investigation of pull-out specimens of one length only. The earlier results were summarized in *Technical News Bulletin* 285, and were published in full in the *ACI Journal* for September 1941, under the title "Bond Stress in Concrete Pull-Out Specimens."

The bond stresses in shorter specimens were found to be considerably more uniform along the length of the bar than was the case with the longer specimens. The previous observation that the bond stresses at the loaded end varied approximately linearly with the applied load was confirmed by the more recent tests.

The bond stresses increased with slip most rapidly at the loaded end and, in general, least rapidly at the free end of the bars. This divergence of the values of bond stress for a given slip was more pronounced for the longer lengths of embedment. The variation of bond stress with slip observed in the previous investigation of 18-inch specimens was found to be in accord with the trend of the data obtained in the

current study of 8- and 12-inch specimens.

#### **SPLICES IN REINFORCING BARS FOR CONCRETE**

It is frequently necessary to splice reinforcing bars at various points in order to preserve the continuity of concrete structures. A common method of splicing is to provide for a sufficient overlap of the reinforcement to permit the transfer of stress from one bar to the other by means of bond between the bar and the surrounding concrete.

To obtain information on the behavior of splices in beam reinforcement a series of tests was conducted. The findings are presented by Ralph Kluge and Edward C. Tuma in the *Journal of Research* for September (RP1669).

The principal objectives of the investigation were to determine the distribution of stress along the lapped bars of the splice and the accompanying bar slip; to compare the effectiveness of two methods of lap splicing, one with the lapped bars in contact with each other; and lastly to compare the behavior of two distinctly different types of reinforcing bars in lap splices of various lengths.

The tests showed that a length of splice 30 or more times the bar diameter was sufficient to develop the yield strength of the bar. Also, that the bond stresses developed within the first few inches of the free end of the bars, lapped 30 or more bar diameters, was independent of the length of the splice but was roughly proportional, within certain limits, to the tensile stress in the reinforcement outside the region of the splice. Contrary to expectations and also to general opinion, the method of lap splicing had no appreciable effect on the behavior or strength of the splice. A substantial difference was observed, however, in the general behavior and maximum bond resistance of the two types of bars.

#### **MINIMUM DESIGN LOADS IN BUILDINGS**

With the completion of American Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, another standard has been added to the series that is being produced under the procedure of the American Standards Association. In this case, the Bureau acted as sole sponsor of the project. The standard contains recommendations for assumptions regarding dead and live loads,



wind pressures, and earthquake forces. Some of these assumptions hold good in any part of the country, whereas others must vary with local conditions. To deal with this situation, the minimum requirements suggested in the case of snow, wind, and earthquakes are supplemented by information supplied in an appendix; this should be useful to local code committees in making necessary adjustments. The appendix also contains tables of weight of materials and of loads caused by different kinds of occupancies, and presents other information intended to assist in the application of the code requirements.

The standard introduces a new treatment of reduction of live loads, based on an investigation of actual loads undertaken by the Public Buildings Administration. It also provides for wind pressures acting outward on walls and roofs, as well as inward. This recognition of outward pressures is in accordance with the known facts, but is a feature not covered by most existing building codes. In the preparation of the standard, use was made of a great deal of technical information available in various divisions of the Bureau.

The standard will be published by the American Standards Association, and also by the Bureau as Miscellaneous Publication M179. Announcement of availability and price will be made in the usual way.

#### DETECTION OF CASE-HARDENING IN GLASS MIRRORS

For use where they are to be subjected to unusual strains or shocks, as aboard ship, glass mirrors are often made out of heat-toughened glass.

It has been the practice of procuring agencies to test these mirrors for heat treatment by stripping off the backing and examining the glass by polarized light. In tests performed at the Bureau during the past 6 months, it has been observed that the test for case-hardening can also be performed by means of polarized light, which is reflected from the silvered surface of the mirror (and which is therefore actually transmitted through the glass twice).

By the use of this reflection procedure, mirrors can be tested without first stripping off the mirror coating. This is desirable because it saves time. In addition, it permits the performance of both the salt-spray test for corrosion resistance and the case-hardening test on the same specimen, without destroying the visible evidence of the effect of the salt-spray test on the mirror backing.

#### REFLECTANCE STANDARDS

The Bureau is now prepared to issue sets of white, gray, and black porcelain enameled standards of  $45^{\circ}, 0^{\circ}$  directional reflectance. These standards are intended primarily for use with reflectometers, being used to measure paints, papers, textiles, ceramic products, and other opaque materials for reflectance and approximate color by the photoelectric tristimulus method. As was pointed out in NBS Circular C429 (July 1942) on photoelectric tristimulus colorimetry, accurate tristimulus measurements are possible only when samples and standard are spectrally similar; hence accurate measurements of the colors of only certain white, gray, and black materials are possible with the new standards.

The use of values of  $45^{\circ}, 0^{\circ}$  directional reflectance in specifications issued by different Government agencies is increasing rapidly. The multipurpose reflectometer developed at the Bureau (J. Research NBS 25, 581 (November 1940) RP1345), and other reflectometers used to measure  $45^{\circ}, 0^{\circ}$  directional reflectance, depend for accuracy upon calibrated reflectance standards used with them.

The new standards have been made from 4- by 4-inch steel panels with folded edges that minimize warpage during enameling. Each set consists of 10 panels with coatings which diffusely reflect approximately 80, 70, 60, 40, 20, 15, 8, 4, 0.8, and 0.5 percent, respectively, of the light that strikes them. Each panel is calibrated for  $45^{\circ}, 0^{\circ}$  directional (or apparent) reflectance for the three filters described in NBS Circular C429 (July 1942). Each set is issued with a report describing its calibration, and is packed in a permanent, hinged-top, varnished wooden box. The fee to nongovernment agencies is \$50 a set.

#### HENRY W. BEARCE RETIRES

Henry W. Bearce, chief of the Bureau's Division of Weights and Measures, after 37 years of Government service, is retiring on September 30 to operate his apple orchards in Maine.

Mr. Bearce entered the Bureau as a laboratory assistant in 1908, after serving for 2 years as instructor in physics at the University of Maine.

During the first several years of his career at the Bureau, Mr. Bearce was employed in the Volumetric Section of the Division of Weights and Measures, and while in that Section he carried out several researches on the density and thermal expansion of liquids of scien-

tific and industrial importance. Among these may be mentioned his researches on ethyl alcohol, American petroleum oils, linseed oil, turpentine, milk, and cream. Extensive tables based on these researches currently serve as the accepted basis for reducing observed volumes and densities of these liquids to standard conditions. His Standard Petroleum Oil Tables are accepted throughout the petroleum oil industry in the United States and to a considerable extent in other countries as the basis for all density and volume corrections to standard temperature. Following World War I he served for a time as chief of the Gage Section of the Bureau.

In recent years Mr. Bearce has been active in standardization work, particularly as related to interchangeable manufacture of screw threads and limit gages, and has written many articles on these subjects. He served as secretary of the National Screw Thread Commission during the life of that body (1918 to 1933) and since 1939 as secretary of the Interdepartmental Screw Thread Committee. He was twice sent to Europe (1919 and 1944) as a member of committees engaged in international standardization projects.

He has served on many technical committees of the Federal Specifications Executive Committee in the preparation and revision of specifications for materials to be purchased by the Federal Government and on sectional committees organized under the procedure of the American Standards Association.

From 1921 to 1940 he served with F. S. Holbrook as co-chief of the Division of Weights and Measures and since 1940 as chief of that Division.

Mr. Bearce has taken an active interest in a proposed revision of the Gregorian Calendar under what is known as the World-Calendar plan. Briefly stated, this is a 12-month, equal-quarter plan, under which January 1 and the beginning of each quarter would always fall on Sunday. He has written several articles pointing out the simplicity and advantages of this plan.

He is a member of the Philosophical Society of Washington, the Washington Academy of Sciences, and the Cosmos Club.

Dr. Wilmer Souder, who has had charge of the Section on Thermal Expansivity, Dental Research, and Identification for many years, and who has served as the Bureau's security officer during the war, has been designated acting chief of the Weights and Measures Division.

## NEW AND REVISED PUBLICATIONS ISSUED DURING AUGUST 1945

### Journal of Research<sup>2</sup>

Journal of Research of the National Bureau of Standards, volume 36, number 1, July 1945 (RP1660 to RP1663, inclusive). Price 30 cents. Annual subscription, 12 issues, \$3.50.

### Research Papers<sup>2</sup>

[Reprints from May 1945 Journal of Research]

RP1651. Method for calculating the properties of hydrocarbons and its application to the refractive indices, densities, and boiling points of the paraffin and monoolefin hydrocarbons. William J. Taylor, Joan M. Pignocco, and Frederick D. Rossini. Price 10 cents.

RP1652. Separation and determination of aromatic and monoolefin hydrocarbons in mixtures with paraffins and naphthenes by adsorption. Beveridge J. Mair. Price 10 cents.

### Simplified Practice Recommendation<sup>2</sup>

R192-45. Crayons, chalks, and related art materials for school use (Types, sizes, packaging, and colors). (Supersedes R192-42.) Price 5 cents.

### Technical News Bulletin<sup>2</sup>

Technical News Bulletin 340, August 1945. Price 5 cents. Annual subscription, 50 cents.

## MIMEOGRAPHED MATERIAL

### Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having a definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC796. Publications relating to building codes and construction practice, home building, building materials specifications, home maintenance. (Supersedes LC653.)

<sup>2</sup> Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Subscription to Technical News Bulletin, 50 cents a year; Journal of Research, \$3.50 a year (to addresses in the United States and its possessions and in countries extending the franking privilege); other countries, 70 cents and \$4.50, respectively.

**RECENT ARTICLES BY MEMBERS  
OF THE BUREAU'S STAFF PUBLISHED IN OUTSIDE JOURNALS\***

Short-time tests of solders and soldered joints. J. A. Kles and W. F. Roeser.

\* These publications are not obtainable from the Government, unless otherwise stated. Requests should be sent direct to the publishers.

Proceed. Am. Soc. for Testing Materials (260 South Broad St., Philadelphia 2, Pa.) 44, 691 (1944).

Simplification, an aid to materials handling. Alvin Hertwig. Material Movement (Materials Publishing Co., 1125 Wolfendale St., Pittsburgh 12, Pa.) 1, No. 1, 9 (July 1945).



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